Accuracy of MLE with Different Continuous-Time Kalman Filters

William Chen

August 2, 2018

The mean absolute distance is calculated as mean(max_lik_σ - true_σ), where max_lik_σ is a vector holding the σ predicted by MLE, and true_σ is the true parameter. The standard deviation of the error just takes std(max_lik_σ - true_σ), and the max absolute error is maximum(abs.(max_lik_σ - true_σ)).

Salient results: CT ODE integration method seems to be both (a) more accurate at inferring the true parameter on average and (b) greater precision (standard deviation of errors is smallest). We also get that the more subintervals which are included, the less accurate the simulated subintervals method is. This suggests to me that somewhere, something is getting coded incorrectly. My first guess for places to check are making sure the size of the fundamental shock and the time step dt are all correctly aligned. For example, the Brownian shock should have variance dt, not variance one, because of how Brownian motions are defined.

CT ODE Integration scheme:

Mean absolute distance	Std(error)	Max abs error
.00122	.0004855	.00199

Subinterval simulation scheme:

Number of subintervals per quarter: 2

Mean absolute distance	Std(error)	Max abs error
.00163	.0005437	.003474

Number of subintervals per quarter: 3

Mean absolute distance	Std(error)	Max abs error
.001636	.0005467	.00347

Number of subintervals per quarter: 12

Mean absolute distance	Std(error)	Max abs error
.00165	.0005526	.003474